Letter to the Editor

Comments on the article: ‘‘A new FE model based on higher order zigzag theory for the analysis of laminated sandwich beam with soft core”, by Chakrabarti, A.; Chalak, H.; Iqbal, M. A. and Sheikh, A. H. [Composite Structures 93 (2011) 271–279].

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In this letter, two refined shear deformation beam models [1], the higher-order beam theory (HOBT) and the sinusoidal shear beam theory (SSBT), are used to compare with the results of the higher-order zigzag theory (HOZT) by Chakrabarti et al. [2]. For verification purpose, symmetric cross-ply composite beams, symmetric and anti-symmetric sandwich beams are anlysed. The material properties and non-dimentional displacements can be found in Ref. [2]. Through the close correlation observed between the present model and the earlier works [3-5] in Tables 1 and 2, accuracy of the present model is established. It may be observed that the results from HOZT are always larger than HOBT and SSBT especially for lower span-to-height ratio.

Table 1: Non-dimensional mid-span displacements of a symmetric cross-ply $[0^0/90^0/0^0]$ composite beam under a uniformly distributed load with cantilever and simply-supported boundary conditions.

Theory	Reference	L/h			
		5	10	20	50
a. Cantilever beam					
HOBT	Khdeir and Reddy [3]	6.824	3.455	-	2.251
	Murthy et al. [4]	6.836	3.466	-	2.262
	Present	6.830	3.461	2.530	2.257
SSBT	Present	6.842	3.478	2.536	2.258
HOZT	Chakrabarti et al. [2]	7.489	3.660	-	2.275

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b. Simply-supported beam					
HOBT	Khdeir and Reddy [3]	2.412	1.096	-	0.665
	Murthy et al. [4]	2.398	1.090	-	0.661
	Aguiar et al. [5]	2.426	1.105	0.762	0.665
	Present	2.414	1.098	0.761	0.666
SSBT	Present	2.444	1.108	0.764	0.667
HOZT	Chakrabarti et al. [2]	2.614	1.170	-	0.667

Table 2: Non-dimensional mid-span displacements of a simply-supported anti-symmetric sandwich [1/2/3/1/3] beam under a uniformly distributed load.

Theory	Reference	L/h			
		10	20	50	100
HOBT	Present	1.1093	0.8544	0.7828	0.7726
SSBT	Present	1.1155	0.8560	0.7831	0.7726
HOZT	Chakrabarti et al. [2]	1.1364	0.8643	-	0.7749
3D Elasticity	Pagano	1.2151	0.8874	-	0.7785

It seems that the results in Table 3 of Chakrabarti et al. [2] are not correct and need modifications. For this symmetric lay-up $[0^0/90^0/C/90^0/0^0]$, all coupling effects from material vanish. Thus, the axial displacement u can not be obtained. Besides, the results are quite small especially for lower span-to-height ratio.

Table 3: Non-dimensional mid-span displacements of a simply-supported symmetric sandwich $[0^0/90^0/C/90^0/0^0]$ beam under a uniformly distributed load.

Theory	Reference	L/h				
		5	10	20	50	100
HOBT	Present	9.4743	3.7328	2.2338	1.8095	1.7487
SSBT	Present	9.3801	3.7235	2.2324	1.8093	1.7487
HOZT	Chakrabarti et al. [1]	7.9568	3.3060	2.1380	1.8112	1.7640

Reference

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3. Khdeir, A. A. and Reddy, J. N. An exact solution for the bending of thin and thick cross-ply laminated beams, *Composite Structures,* 1997, *37,* 195-203

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5. Aguiar, R. M.; Moleiro, F. and Soares, C. M. M. Assessment of mixed and displacement-based models for static analysis of composite beams of different cross-sections, *Composite Structures,* 2012, *94,* 601 – 616.